MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER III, 2022/2023 - (TRIM ID 2230)

PMT0101 – MATHEMATICS I

(Foundation in Information Technology)

2 OCTOBER 2023
9.00am – 11.00am
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 6 pages with **FIVE** questions.

2. Attempt **ALL** five questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the answer booklet provided. All necessary working steps **MUST** be shown.

4. You are required to write proper steps to obtain maximum marks.

Question 1 [10 marks]

a) Simplify the following expression. Write your final answer as positive exponents.

$$\frac{a^{10}\times\left(4b^{8}\right)^{\frac{1}{2}}}{\left(a^{16}b^{24}\right)^{\frac{1}{4}}}$$

[2 marks]

b) Simplify the following expression. Write your final expression as a single fraction.

$$\frac{y}{3x}-\left[\frac{2y}{x}\times\frac{3x^{2}-x}{6xy\div 2y}\right]$$

[2 marks]

c) Factorize the following expression completely: $x^{3}-3x^{2}-x+3$.

[2 marks]

d) Rationalize the denominator of the expression and simplify: $\frac{10}{4-\sqrt{2}}$.

[2 marks]

e) Express the following complex number in the form $a+bi$ where a and b are real numbers.

$$\frac{4+3i}{1-i}$$

[2 marks]

Continued...

Question 2 [10 marks]

a) Solve the quadratic equation by factoring method.

$4x^2+11x-20=5x-10$. [3 marks]

b) Solve the radical equation $x-8=2\sqrt{x+7}$.
Please check the correctness of your answer.

[3 marks]

c) Solve the following inequality: $\dfrac{(x+2)(x-3)}{(x-5)}>0$.

Show clearly your Sign Diagram and write your final answer in interval notation.

[4 marks]

Question 3 [10 marks]

a) Diagram 1 shows the relation between set A and set B in the graph form.

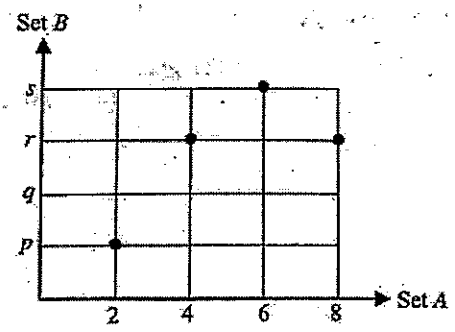


Diagram 1

i) Write the relation in ordered pair form.

ii) State the type of relation between set A and set B.

iii) Find the range of the relation.

[2 marks]

Continued...

b) Diagram 2 shows the graph of $h(x)=|x-2|+3$ for the domain $0 \le x \le 7$.

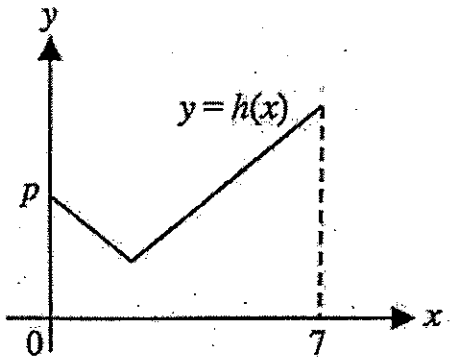


Diagram 2

i) Find the value of p.

ii) Find $h(7)$.

iii) Find the range of $h(x)$ corresponding to the given domain.
Write your answer in interval notation.

[3 marks]

c) In Diagram 3, the function f maps set P to set Q and the function g maps set Q to set R.

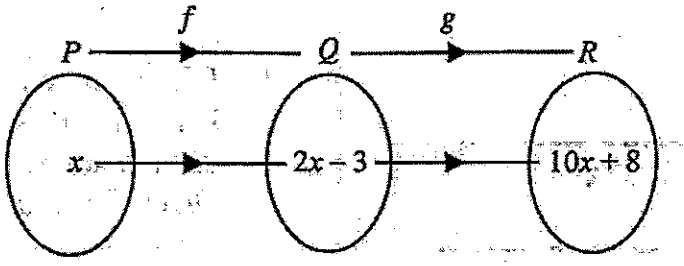


Diagram 3

i) Find the function that maps set Q to set P.

ii) Find the value of x such that $g(f(x))=16x+3$.

[3 marks]

Continued...

d) Given $g(x)=4-3x$ and $h(x)=\frac{x}{x+2}, x\neq -2$. Find $g(h(4))$.

[2 marks]

Question 4 [10 marks]

a) Consider a polynomial $P(x)=2x^3-3x^2+x+1$.
Use long division to find **the quotient and remainder** when $P(x)$ is divided by $(x-2)$.

[3 marks]

b) Use Remainder Theorem to find the remainder when $f(x)=0.1x^3+0.2x$ is divided by $(x+1.5)$.

[2 marks]

c) Find the value of $\log_5 25\times\log_3 7\times\log_7 3$. Show all steps.

[2.5 marks]

d) Solve the equation $1+\log_2(2x+3)=\log_2 6x$.

[2.5 marks]

Continued...

Question 5 [10 marks]

a) Diagram 4 shows a quadrilateral $EFGH$. Point G lies on x-axis. The equation of the straight line EF is $3y+x=27$.

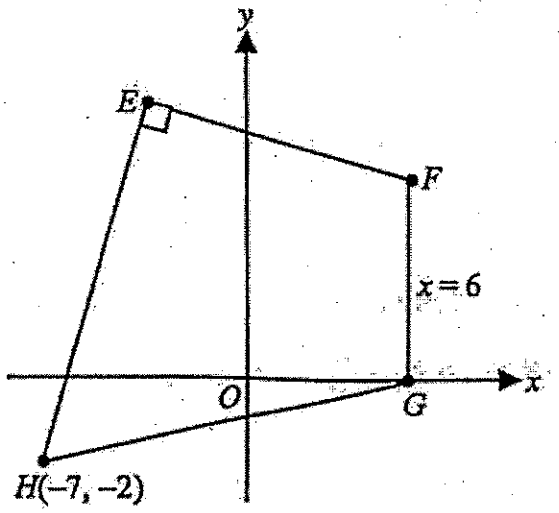


Diagram 4

i) Find the equation of the straight line EH.

ii) Find the coordinate of point E.

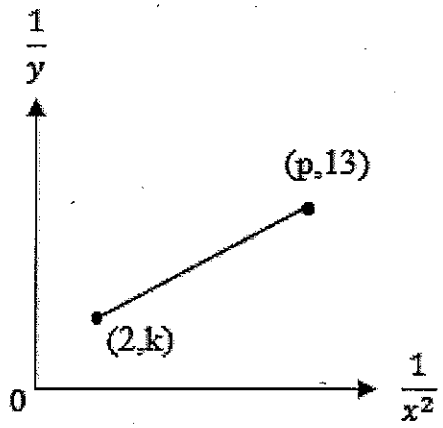
iii) A point T moves such that its distance from point H is always 8 units. Find the equation of the locus of T.

[7 marks]

Continued...

b) Two variables x and y are related by an equation $\frac{x}{y}=\frac{2}{x}+3x$.

The diagram below shows a straight line obtained by plotting $Y\left(=\frac{1}{y}\right)$ against $X\left(=\frac{1}{x^2}\right)$.



i) Express Y in terms of X.

ii) Find the values of p and k.

[3 marks]

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